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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,097	11/25/2003	Miwa Kozawa	032132	4454
38834 7590 01/11/2007 WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036			EXAMINER CHACKO DAVIS, DABORAH	
			ART UNIT	PAPER NUMBER
			1756	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/11/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/720,097

Applicant(s)

KOZAWA ET AL.

Examiner

Daborah Chacko-Davis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/03</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election without traverse of Group I (claim 1-20) in the reply filed on 10/05/2006, is acknowledged. Claim 21 (Group II) is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-19, are rejected under 35 U.S.C. 103(a) as being unpatentable over EP1152036 (Kanda et al., hereinafter referred to as Kanda) in view of U. S. Patent No. 5,173,393 (Sezi et al., hereinafter referred to as Sezi).

Kanda, in [0001], [0006], [0007], [0008], [0016], [0020], [0023], [0024], discloses a process for forming a resist pattern by forming a resist pattern on a substrate (underlying object), heating the resist pattern formed on the substrate to a temperature of 50 to 140°C, applying a water-soluble resin composition (a resist pattern thickening material) on the resist pattern, wherein the resist pattern thickening material includes a metal-free surfactant (second surfactant) (claims 1-3, 7). Kanda, in [0009], [0011], [0012], [0016], [0018], [0019], [0022], discloses that the resist pattern thickening

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material is a water-soluble resin composition that includes i) a resin such as polyvinyl alcohol, ii) a crosslinking agent such as a melamine derivative, iii) an organic solvent such as alcohol solvents, ester solvents, and ether solvents (claims 10-15). Kanda, in [0024], discloses that the resist pattern thickening material (coating material) is developed in pure water, after applying the coating material onto the resist pattern (claims 16-17). Kanda in [0023], discloses that the resist pattern material is an ArF resist (resist exposed using an ArF excimer laser) (claim 18).

The difference between the claims and Kanda is that Kanda does not disclose applying a first surfactant on the resist pattern to be thickened. Kanda does not disclose that the resist pattern is heated after applying the surfactant. Kanda does not disclose that the surfactant composition includes a solvent that does not dissolve the resist pattern to be thickened, and that the solvent is water (claims 4-5). Kanda does not disclose that the surfactant composition is a metal-free surfactant such as non-ionic surfactant and is selected from the group recited in claim 9 (claims 6, 8-9). Kanda does not disclose that the ArF resist material is selected from the group recited in claim 19.

Sezi, in col 6, lines 60-68, in col 8, lines 9-11, discloses that a surfactant solution that is metal-free, and is non-ionic, such as alcohol is applied on the photoresist structure, and the treated photoresist structure is dried by heating. Sezi, in col 7, lines 30-58, discloses that the photoresist structure is treated with a reactant that comprises isopropyl alcohol (non-ionic surfactant) and has a solvent such as water (that does not dissolve the resist pattern). Sezi, in col 3, lines 3-6, in col 4, lines 44-60, discloses that

the photoresist material that forms the photoresist structure is derived from polymerization or copolymerization of olefinically unsaturated anhydrides, and that the anhydrides can be cyclic.

Therefore, it would be obvious to a skilled artisan to modify Kanda by employing the process of treating the resist pattern to be thickened with a surfactant solution as suggested by Sezi because Sezi, in col 7, lines 3-8, and in col 8, lines 38-55, discloses that the resultant photoresist structure has an increased etch resistance and is therefore suitable to be used as an etch resistant mask. It would be obvious to a skilled artisan to modify Kanda by employing the resist pattern material suggested by Sezi because Sezi, in col 4, lines 44-55, discloses that the resist material used for forming the photoresist structure includes reactable groups such as anhydrides that do not exhibit an increased absorption of DUV light.

4. Claim 20, is rejected under 35 U.S.C. 103(a) as being unpatentable over EP1152036 (Kanda et al., hereinafter referred to as Kanda) in view of U. S. Patent No. 5,173,393 (Sezi et al., hereinafter referred to as Sezi).

Kanda, in [0001], [0006], [0007], [0008], [0016], [0020], [0023], [0024], and [0038], discloses a process for forming a semiconductor device by forming a resist pattern on a substrate (underlying object), heating the resist pattern formed on the substrate to a temperature of 50 to 140°C, applying a water-soluble resin composition (a resist pattern thickening material) on the resist pattern, wherein the resist pattern thickening material includes a metal-free surfactant (a second surfactant) that thickens the resist pattern (claim 20). Kanda, in [0038], discloses that the fine resist pattern

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formed after the thickening process and developing, can be used as a mask to form trenches or holes in the underlying semiconductor substrate (by etching thru the mask).

The difference between the claims and Kanda is that Kanda does not disclose applying a surfactant composition that has a first surfactant on the resist pattern to be thickened.

Sezi, in col 7, lines 30-58, discloses that the photoresist structure is treated with a reactant that comprises isopropyl alcohol (non-ionic surfactant) and has a solvent such as water (that does not dissolve the resist pattern)

Therefore, it would be obvious to a skilled artisan to modify Kanda by employing the process of treating the resist pattern to be thickened with a surfactant solution as suggested by Sezi because Sezi, in col 7, lines 3-8, and in col 8, lines 38-55, discloses that the resultant photoresist structure has an increased etch resistance and is therefore suitable to be used as an etch resistant mask.

### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent

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Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

December 18, 2006.



MARK F. HUFF  
SUPERVISORY PATENT EXAMINER  
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